**Air Donuts Demonstration\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_**\_\_\_\_\_

**Demonstration**

**Introduction:**

This experiment uses a trash can as a vortex generator to show Bernoulli’s principle. Bernoulli’s principle states that the faster a flow of air is moving the lower its pressure.

**Expectations Addressed:** Grade 12 Physics, College Preparation.

**Materials:**

Large Bucket or Trash Can

Plastic shower Curtain

Fog Machine

**Safety Precautions:** 1.The fog machine fluid is made from a water and glycol solution that is not considered to be hazardous, however it may cause respiratory or throat irritation for some students. 2. Never shoot smoke in anyone’s face.

**Procedure:**

1. Carefully cut a 5-to 7- cm hole in the bottom center of the bucket.
2. Stretch a piece of the shower curtain across the top of the bucket and secure it tightly in place using Dutch tape.
3. Lightly hit the shower curtain with your hand. An invisible blast of air shoots out of the hole.
4. To make the invisible blast of air visible, add a little smoke from the fog machine.

**Discussion:**

The blast of air that shoots out of the cannon is actually a flat vortex of air. A vortex is generated because the air exiting the container at the center of the hole is traveling faster than the air exiting around the edge of the hole. Air has mass and Bernoulli’s principle states that fast moving air creates an area of low pressure. Since the air inside the vortex is moving faster than the outside air, the resulting inward pressure is the force that holds the smoke ring together.

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**Student Worksheet:**

**Name:**

1. According to Bernoulli’s principle what is the relationship between a fluids velocity and pressure?

Situation: Hitting the shower curtain membrane on the bucket.

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| --- | --- | --- | --- |
| **Predict:** | **Explain:** | **Observe** (with fog): | **Explain:** |

2. How could we make the vortex larger?

3. Explain how each of these examples relate to Bernoulli’s principle.

(Mount St. Helens, Hoover Dam, First Plane, Smoke Rings)



